

PROBLEMS OF DEEP HYDROCARBON RESERVOIR EXPLOITATION IN THE SOUTH CASPIAN BASIN

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Deep hydrocarbon reservoir exploitation (over 4-4,5 km) in the South Caspian Basin is connected with a number of features based on the variety of phase hydrocarbon relations (oil-gas-condensate reservoirs and gas-condensate reservoirs with oil slugs), the worsening of matrix reservoir properties of rocks and increase of interstice space heterogeneity structure, and abnormal pressure as well.

The interpretation results of well logging; analysis data on core samples using methods of sedimental petrology, including thin sections composition study; scanning of rock structures using electronic microscope, x-rays, permeability study, x-ray tomography of samples, mercuric pyrometry (together with UNOCAL Company); information on well testing and exploitation of deep fields situated in the South Caspian Basin, such as Bakhar, Bulla-deniz, named after March 8, Janub, Sangachali-deniz-Duvanni-deniz-Khara-Zirya show that:

- the sedimentary complex of Productive Strata rocks at deep deposits is characterized by intermittency of structure; upward fining cycles (at the level of strata) are independent groups of oil and gas content, where their lows consist of oil-gas-condensate accumulations (oil is often as oil slugs), and their highs are gas-condensate reservoirs.
- at large depths there occurs a variety in porosity values of reservoir rocks within the contour and out of the counter area; analysis of average porosity values distribution on producing horizons of deep seated fields, such as Bakhar and Bulla-deniz, show an average 18% (relative) porosity exceed of oil- and gasbearing rocks against waterbearing ones. Evidently, in a young geosynclinal basin with rather intensive sediment accumulation the epigenetic transformations of rocks influenced by such major factors as load pressure and temperature are seen more clearly at the depths over 4 kms. In this, a more progressive epigenesis in watersaturated areas and essentially slow one in the areas of hydrocarbon accumulation causes a difference in porosity of watersaturated and oilsaturated rocks.
- it is known that the initial formation pressure decrease while hydrocarbon reservoirs developing (difference between overburden and formation pressure) leads to worsening the percolation - capacity properties of reservoir rocks in time. The above effect has been found in the reservoir of horizon VII, Bulla-deniz Field. The average depth of reservoir is 5600 m. For 14 years of development the initial formation pressure decline is from 71,3 MPa to 31 MPa, i.e. over 40 MPa, and effective pressure increase is up to 106,1 MPa or 1,6 time increase. The study in time of such parameters as relative SP amplitude (Δsp) and reservoir rock porosity calculated on its basis that have been carried out for four time periods show a statistically stable reservoir rocks porosity decrease in the range within 0,167 (development start) and 0,137 (current data) i.e. the relative porosity change is 18%.

The results obtained may be used to enhance exploration of deep structures, they should also be taken into consideration in the process of hydrocarbon reserves estimation, development design and analysis.